Damage to Archaeological Sites on Tutuila Island (American Samoa) Following the 29 September 2009 Tsunami*

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INTRODUCTION

TUTUILA ISLAND IS PART OF THE SAMOAN Archipelago (Figure 1), located in the South Pacific. On September 29, 2009 an 8.0-8.3 magnitude earthquake occurred close to 200 km SW of Tutuila in the Tonga Trench; it triggered a massive tsunami that killed more than 200 people. On Tutuila 34 people lost their lives, on ‘Upolu 183 died, and on Niuatoputapu 9 perished. Tutuila experienced at least three destructive waves, up to 17 m in height and reaching over 700 m inland in some areas.

More than 20 villages on Tutuila sustained substantial damage. At least half of the houses were destroyed in villages located at the eastern and western ends of the islands, such as Tula, Poloa, ‘Aman-ave, Fagasā, Vatia and Āsili, among others. Beaches were heavily impacted with enough erosion in places to expose cultural deposits. The banks and beds of nearshore steams were also scoured by the receding tsunami waves. The impetus behind the survey reported upon here was to record coastal and riparian archaeological remains exposed by the tsunami.

TUTUILA ARCHAEOLOGY

Tutuila Island has been inhabited for 2500 years, and perhaps longer (Addison and Asaua 2006; see discussion in Addison and Morrison n.d.; Clark and Michlovic 1996; Rieth, et al. 2008). Ceramic sites are widespread on the island and appear to all date prior to ~1200 cal BP, with the outlines of their spatial and chronological patterning begin-

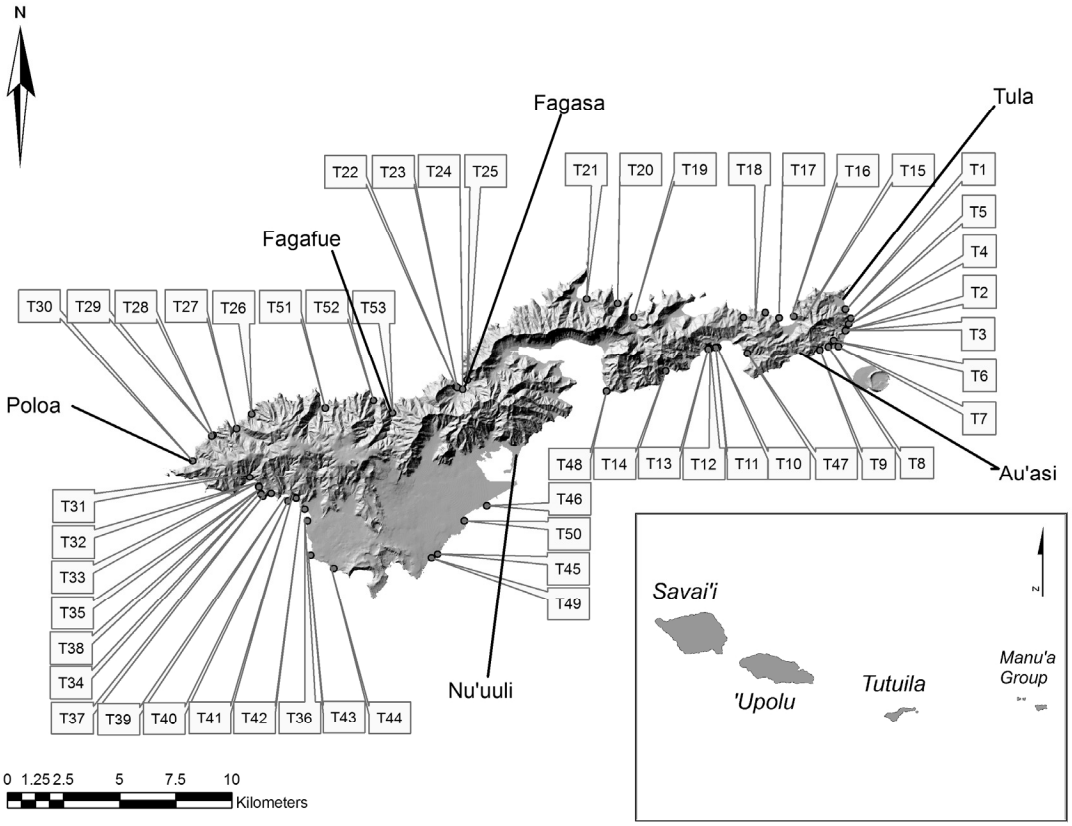

Figure 1. Site locations. Inset shows Tutuila’s location in the Samoan Archipelago.

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ning to be understood (Addison, et al. 2008a). Analyses of clay geochemistry (Bartek 2009) and temper (Eckert 2006; Eckert and Pearl 2006) may provide clues to the dynamics of pottery production and exchange on Tutuila.

Explicit settlement pattern studies have thus far focused on eastern Tutuila (Clark and Herdrich 1988; Clark and Herdrich 1993; Clark 1989) although a growing body of data from western Tutuila remains to be synthesized (Cochrane, et al. 2004; Shapiro and Cleghorn 1994; Taomia 2001a; Taomia 2001b; Taomia 2002). On current evidence, there appears to have been widespread use of both interior and coastal areas from soon after initial settlement (Addison and Asaua 2006; Addison, et al. 2008a), which contradicts the notion of inland settlement beginning at only ~600-700 cal BP (Pearl 2004). Little work has been done on ancient subsistence economy on Tutuila, but initial investigations have addressed marine procurement, isotopic diet, and irrigation (Addison and Gurr n.d.; Morrison and Addison 2009; Morrison and Addison 2008; Valentin, et al. in review).

Adze production sites have long been recognized as an important part of the archaeological landscape of Tutuila (Buck 1930). Archaeological research directed at this kind of site on Tutuila was pioneered in the 1980s (Ayres and Eisler 1987; Best, et al. 1989; Clark and Herdrich 1988; Clark 1989; Clark 1993; Leach and Witter 1987, 1990).

Early geochemical studies began the process of defining the range of variability in Tutuila adze material and indicating the vast area of the southwest Pacific over which finished adzes were distributed (Ayres and Mauricio 1987; Best, et al. 1992; Clark, et al. 1997). Recent work has continued to refine the geochemical characterization of Tutuila basalts (Crews 2008; Johnson in press; Johnson, et al. 2007; Winterhoff 2003; Winterhoff, et al. 2007) and has increased understanding of their extra-Samoan distribution (Clark 2002; Di Piazza and Pearthree 2001, 2004).

In the last decade the number of known lithic manufacture sites on Tutuila has increased to over 50 (Addison n.d., 2007a, 2007b, 2007c, 2007d, 2008a, 2008b; Addison and Asaua 2006; Crews 2008; Ishimura and Addison 2005, 2007; Taomia 2005; Walter and Addison 2005; Winterhoff 2003, 2007; Winterhoff, et al. 2006). The sites reported here nearly double the number of known lithic sites on Tutuila. The chronology of lithic manufacture and export is poorly understood, but well-dated large-scale lithic manufacture sites on Tutuila all currently fall near the ~700-600 cal BP period (Addison n.d.).

The importance of understanding geomorphological history has long been recognized in Samoa (Clark and Michlovic 1996; Dickinson and Green 1998; Green 2002; Jennings 1974; Kirch 1993). Recent work suggests that intense volcanism on western Tutuila was an important factor during the last 2000 years (Addison and Asaua 2006; Addison, et al. 2006). Another important process affecting Tutuila's coasts was sea level stabilization at near-modern levels and consequent coastal progradation by ~1500 BP (Addison, et al. 2008b; Morrison, et al. n.d.). Clearly, there are many different factors that have affected the formation of sites on Tutuila, especially at coastal locations. The role of tsunamis on Tutuila has not been explored, and while we recognize its potential importance, that aspect is not the focus of this paper.

POST-TSUNAMI COASTAL SURVEY PROJECT

This project brought three archaeology graduate students to Tutuila to work with local assistants in recording archaeological material exposed by the tsunami. Chris Filimoehala from the University of Hawai'i, Manoa and Enders (Junior) Vailolo formed a team; Seth Quintus from North Dakota State University and Tala (Murry) Tiatia worked together; Tom Sapienza from UC Berkeley and Becca Rollins were a third survey team; David Addison directed the project. Funding was provided by the National Science Foundation. The field work was completed in the first two weeks of November 2009.

The survey strategy was simple; all accessible parts of the coast of Tutuila were walked and examined for exposed archaeological material. The survey included beaches, cutbanks behind beaches, inland areas for as far as the tsunami reached, and stream beds adjacent to the coast. We use "site" as a counting and management tool and imply no meaning from the past to our designations; the meaning of our site designations is contemporary and merely a recording device. Although we recognize that an abandoned village and an isolated artifact are not comparable in size or in research potential, given the cultural-resource-management system in American Samoa, we thought this the most efficient way to record and count the archaeological remains found during this project. Non-contiguous archaeological materials were designated as separate sites, except at Fagasā beach, which was divided into four sections for ease of recording and sample collection. Sites were described on American Samoa Historic Preservation Office (ASHPO) forms and given temporary numbers prefixed by "T". Permanent site numbers based on the American Samoa Site Numbering System will be assigned by ASHPO.

SUMMARY RESULTS

More than fifty sites were designated during the survey (Table 1). These range in size from whole coastal settlements (e.g., Fagafue, Aoloau Tuai) to single isolated artifacts and include major lithic manufacture sites, exposed stratigraphy with cultural layers, and a variety of other archaeological remains. The overwhelming majority of these are lithic sites, or sites with a lithic component (Table 2). Half of these are lithic scatters not in primary context (lithics found on beaches are interpreted as being out of primary context). Although some may question the utility of such archaeological remains, they were recorded because they indicate the potential presence nearby of lithics in primary context and provide valuable information on the distribution of lithic sites on Tutuila.

NORTHWEST COAST – POLOA TO FAGAFUE

The northwest section of the survey area comprises the coastline from the village of Poloa to Fagafue. Villages included in this section are Poloa, Fagali'i, Mālōatā, and Fagamalo as well as the abandoned villages of Aoloau Tuai, Āsu Tuai, and Fagafue. Eight sites were designated. Lithic scatters were located along the coasts of all seven villages, and a complex of grinding stones (*foaga*) was recorded at Fagali'i.

All villages in this survey area had substantial lithic scatters on their beaches, except Āsu Tuai where minimal lithics were found. Tsunami impact was variable, with little visible effect to the beach areas of Āsu Tuai, Fagamalo, and Fagali'i. There was a large amount of apparent erosion of portions of the beach at Mālōatā and Poloa and major impacts on vegetation at Aoloau Tuai and Fagafue. Lithics (tools and flakes) recovered from the beach areas of all villages are interpreted as being in non-primary context. The materials utilized for lithic manufacture are basalts of varying quality. A section of the coast at Poloa was eroded away to the edge of the road running parallel to the sea. Flakes were located within the eroded wall, but there were no discernable layers visible and the artifacts were found in association with modern materials such as plastic and other contemporary refuse. The location of the lithics is likely the result of the road's construction; they were possibly displaced from directly above.

A complex of grinding stones was recorded along the beach at Fagali'i. At least six grinding facets are present on one large boulder located near a substantial seawall that is apparently constructed of local rocks. The majority of the boulder is below the surface and there may be more grinding facets on the unexposed portion. Three other grinding facets were found on rocks utilized in the nearby seawall, and are obviously in non-primary context. The large boulder with six visible facets is interpreted as being in primary context because it is too large to have been utilized in the seawall's construction.

NORTHEAST AND SOUTHEAST COASTS – FAGASĀ TO TULA AND TULA TO 'AU'ASI

The eastern section of the survey stretched from Fagasā on the north-central coast to Tula at the eastern tip of Tutuila and along the south coast from Ālao to 'Au'asi. Twenty sites were designated during the survey of this section of the island. Out of the twenty, thirteen were lithic scatters, three were isolated lithic artifacts, two were cultural layers, one was a grinding stone, and one was an isolated pottery find. Previously undesignated sites were noted at Ālao, 'Au'asi, Vatia, Masausi, Amalau, Sa'ilele, Āfono, Tula, and Utumea. Previously designated sites that were visited included 'Aoa and Fagasā. Although the artifacts at 'Aoa were found in old site boundaries, the artifacts were in new localities, not designated by Clark and Herdrich (1988). Fagasā has a continuous distribution of lithics on its beach, so for ease of recording and sample collection the beach was split into four sites based on natural boundaries (e.g., streams).

While most sites in this section of the island had some sign of damage from the tsunami, the damage in 'Aoa, Sa'ilele, Utumea, 'Au'asi, and Amalau was very limited, if in fact there was any damage at all. Sites at Tula, Ālao, Āfono, Fagasā, and Vatia were more disturbed by the tsunami. The two beachside cultural layers at Ālao were likely exposed by the tsunami, as was the lithic scatter at Vatia, which is located in a heavily wooded area destroyed by the tsunami.

Lithics found on beaches are interpreted as being out of primary context. Sites in this category were found in the villages of Ālao, 'Au'asi, Sa'ilele, Āfono, and Masausi. Four lithic scatters are interpreted as in primary context: two at Utumea, and one each at Vatia and Tula.

The lithic artifacts were all made of basalt of differing qualities. Lithic scatters at Fagasā, Vatia, and Utumea produced a large amount of flaking debris, preforms, and a limited number of finished adzes. Although the other lithic sites, such as Sa'ilele, Āfono, and Masausi, produced a limited number of artifacts, they still included flaking debris, preforms, and finished adzes. The two grinding stones found on the eastern end of the island were both made of basaltic rock. The first, at Tula, was in the boundaries of a lithic scatter, had one facet, and was fragmentary. The other, at Amalau, had two facets and was out of primary context and now serves as a decorative piece.

Only one Samoan plainware sherd was found on the survey. The sherd came from the eastern side of 'Aoa bay. This weathered ceramic piece is thick with an orange/red hue. The temper is coarse and made of basaltic stone. The two cultural layers at Ālao both consist of dark layers of soil. No artifacts were seen in these layers, but some possible basalt debris was noted in each. Soil samples were taken from each layer for further analysis.

SOUTH COAST NU'UULI TO 'AU'ASI

Seven sites were designated on the southern coast from Nu'uuli in the west to Amouli in the east. These were located at the villages of Āmaua/Lauli'i, Ālega, Utusi'a, Faga'itua, and Ālōfau. Four sites are cultural layers with associated lithic scatters located at Āmaua/Lauli'i, Utusi'a and Utusi'a/Faga'itua. One site is a single portable grinding stone located at Utusia, and two sites are lithic scatters found at Ālega and Ālōfau. A total of twelve sites were designated within the two sections, six lithic scatters, four cultural layers, and two grinding stone sites.

The cultural layers recorded in this survey area were all located in exposed cutbanks (Figure 2). A site designated at the border of 'Aūa and Lauli'i is located below the roadway and consists of materials that could possibly be the product of road construction. All other cultural layers contained lithic manufacture debris. A site at Utusi'a contained flakes in and around a cutbank that was likely exposed by the tsunami. Two other sites revealed stratigraphy exposed when the tsunami eroded away sections of the seawall between the vil-

lages of Utusi'a and Faga'itua. Flakes and tools are present in multiple layers of each of these sites, as well as on the surface in association with them. Flakes and tools, particularly adze preforms, were collected from these two sites. Artifacts collected were manufactured from basalt. The artifacts are considered to be in non-primary context, possibly the result of either colluvial deposition or road construction.

A single portable grinding stone was recorded at Utusi'a. The grinding stone is found in a block of dense basalt that appears to have been shaped into a dressed rectilinear form. This artifact is considered to be in non-primary context as it is located on the surface of the beach and can be easily moved. Basalt flakes were recorded in an exposed sea bank in proximity to the grinding stone.

Lithic scatters were recorded in Ālega and Ālōfau. The scatter at Ālega is found along portions of exposed rock beneath beach sand and continues up a streambed into an inland area previously reported as a lithic manufacture locale (Clark 1992). Artifacts at both sites are considered to be non-primary in context.

Figure 2. Exposed stratigraphy seen in cutbank between the villages of Utusi'a and Faga'itua. Upper light layers are interpreted as former road beds; lower dark layer (and beach) contain numerous lithics. White arrows point to cultural stratum with abundant lithics.

WEST TUTUILA

The western portion of the survey ran from Poloa, near the western tip of Tutuila, along the southern coast and around the edge of the airport, Nu'uuli. Eighteen sites were designated in this section of the coastal survey, and the majority (fourteen) contained lithics, grinding stones, or a combination of the two. The remaining four sites were a lithic scatter among a cultural layer, a cultural deposit, cupules, and the location at which human bones were found immediately after the tsunami. Tsunami damage was extensive on this part of the island. The damaged ranged from exposure of cultural deposits, to scouring of vegetation surfaces to reveal lithic scatters, to erosion of beach areas.

With the exception of the lithics found near the bus stop in Fagamutu, none of the lithics are interpreted to have been in primary context. Other flakes were seen on the roadside farther east in Fagamutu, possibly disturbed by road construction, and at the Āmalu'ia stream mouth, lithics were seen in a steam cut in a highly-disturbed context (unfortunately, extremely heavy rains and stream flooding during this part of the survey prevented recovery of these flakes). At Āsili, a single Type I adze was found along the beach near the stream mouth, and no other lithics were seen nearby; it is possible that this was washed down by erosion farther up the stream. In the stream at Se'etaga, many lithics were found, including preforms and utilized flakes, but these are also likely to have been uncovered and moved by erosion; the tsunami damage in the immediate area was powerful enough to have destroyed a small footbridge immediately adjacent to where the flakes were found. Likewise, many flakes were found in walls of the Nua stream, though they were in unmistakably out of primary context, being found above strata containing historic items such as plastic tarps, a padlock, and bottles.

At Sogi in Leone, near the previously designated Fagalele grinding-facets site, a lithics were present on the surface exposed by the tsunami immediately adjacent to the grinding facet beds. These lithics had morphology ranging from simple flakes to more complex tools. The lithics are associated with traditional habitation remains such as pebble paving and fire-affected rock.

A large number of stone tools were also found in front of the Ā'uma section of Leone. These tools were only visible during low tide, and were mostly found in naturally occurring holes and depressions in the rock making up the floor of the bay. It seems likely that they were washed out into the bay by water runoff. Among the many flakes that were found were scrapers and an adze/chisel.

Grinding stones were found throughout this section of the island. In the western branch of the Āmalu'ia stream, there were ~80 grinding facets found on many boulders. The largest boulder had at least 25 facets, and several other large boulders had from 5 to 10. The stream also contained several portable grinding stones. Heavy rains during the day on which facet counting occurred precluded the gathering of exact numbers. In the east branch of the Āmalu'ia stream,

there are at least 10 facets found on 3 boulders. The largest one has 6 visible facets, a nearby smaller one has at least 3, and a third has just 1. The second boulder could possibly be considered portable, and the third is definitely a portable grinding stone. At Se'etaga, 3 grinding stones – all portable, and each with 1 facet – were found in the sea wall at the end of the stream. At Nua, three portable grinding stones have been incorporated into the roadside decorations. One has 5 facets, and the other two have 1 facet each. In the stream at ʻĀtauloma are a number of grinding stones including at least 25 facets were already known, but during this survey a number of additional grinding stones were discovered farther upstream: 3 boulders with multiple grinding facets and a single grinding surface at the top of the waterfall upstream of the bridge.

The low tide at Vaitogi exposed grinding facets under and above water. During low tide, at least 90 were seen above water and more than 60 were submerged along the shoreline. A single grinding facet was found at Vailoatai in the lava rock beach cliffs, and despite extensive survey in the area, no further grinding facets could be found and there was no indication that more would be visible during low tide. In the rock near the southern airport runway there are at least 180 grinding facets present.

Cultural deposits were found at Fagamutu and Vaitogi. At Fagamutu, the cultural deposit contained some shell and coral, but was not in association with the recovered lithics mentioned above. At Vaitogi the cultural deposit was found near a World War II pillbox, and is marked primarily by a darker layer of soil containing some shell and coral. A set of 9 cupule-shaped holes were found in the rock cliffs at Taputimu. These holes were smooth and fairly regularly spaced, and possibly relate to an isolated historic structure.

Immediately after the tsunami, people at the Maliu Mai resort in Fogāgogo discovered human remains eroding from a cut made when the tsunami knocked down a retaining wall. These bones and others were dug out of the cut and reburied later. The survey team visited the location just before the cut was reburied by the construction of a new wall, and saw what looked like human teeth and animal bone in the area where the original bones were found. Local community members wished for no further excavation or examination of the bones, and they were left in place to be reburied by the new wall construction.

LITHICS

Lithic scatters were the most commonly found type of site during the survey. Lithic scatters consist of more than one piece of stone interpreted as being manufacturing debris created in the process of stone tool making. During the survey, a sample of lithic artifacts was taken from each site. The number of flakes taken from each site depended on the size of the site. For large sites a sample was taken; for small sites or isolated finds all surface artifacts were collected.

As noted earlier, adzes with geochemistry similar to Tutuila source material have been found dispersed over a 5400 km span of the southwest Pacific. Our main discussion here concerns the adze manufacture process. Although bifacially modified flake tools interpreted as coconut graters (*tuai*) or vegetable peelers (*asi*) and showing a high degree of uniformity are a near-ubiquitous feature of Tutuila's archaeology (Addison 2008b; Clark, et al. 1998), and it is highly likely that there were specialized manufacture sites for this kind of tool (Addison 2008a, n.d.), our analysis has not yet focused on them and their possible manufacture sites and we merely note here their presence in our samples.

The adze manufacturing process produces cores, waste flakes, blanks, preforms, and finished products. Waste flakes are artifacts that are hit off a core piece of stone; occasionally waste flakes are further utilized and made into tools (for discussion of Samoan flake tools see Clark, et al. 1998). Cores are large pieces of rock that exhibit a number of dorsal scars associated with the deliberate extraction of flakes. In the adze-making process, blanks are artifacts exhibiting initial signs of tool formation, that have not yet taken the shape of the presumed finished product, while preforms are artifacts that have been worked to the point in which an adze shape is recognizable and represents the final stage before the polishing process (for further discussion of Samoan adze preforms and blanks see Leach and Witter 1987, 1990). After polishing, the final product in Samoan stone adze making is the partially or fully polished adze (for further discussion of Samoan adzes see Best, et al. 1992; Buck 1930; Green 1974; Green and Davidson 1969).

The following is the preliminary count of each artifact class (see Table 2). As these numbers are preliminary, they will likely change as further analysis is undertaken. A total of 1347 lithic artifacts were collected. Of the 1347, 11 are adzes, 87 are preforms/blanks, 5 are cores, and 1244 are flakes. At this point in our analysis, a distinction between preforms and blanks cannot be made. In addition, there is no doubt that many of the flakes that were found exhibit signs of modification and/or utilization, but analysis to determine the exact number of utilized flakes and the extent of utilization has not yet been completed. Hence, all flakes are grouped into one category, regardless as to whether or how they were modified.

Where possible, adzes and adze fragments were assigned to "type" following Green and Davidson (1969) and revisions by Green (1974). Of the adzes that are sufficiently intact to type, five are Type I and two are Type III. Three of the adzes exhibit possible signs of being reworked into another tool; one of these has retouch on the pole end, while the other two are reworked on the bevel and sides. The distribution of these adzes by site is presented in Table 2.

The largest assemblages of lithic artifacts come from Aoloau (379), Fagasā (149), Fagafue (142), and Mālōatā (107). The Aoloau assemblage consists of a large amount of small flakes, preforms, and finished adzes, suggesting late stage tool manufacturing throughout the site (Ahler 1989;

Kahn 1996; Winterhoff 2007). Further analysis of the distribution of these artifacts within the site will shed light on specific activity areas. The Fagasā and Mālōatā collections are similar to the collection from Aoloau, though they also have larger flakes with cortex. Given these data, it may be concluded that all stages of a lithic tool manufacturing process were practiced at both Fagasā and Mālōata. The Fagafue collection, however, likely represents only the beginning stages of the manufacturing process because the majority of manufacturing debris found at the site consists of large flakes with cortex.

Although further discussion of manufacturing stages for each site cannot be undertaken at this time, it is clear that an array of stages is present in the collections from sites throughout the island. During a survey, however, one is more likely to find larger flakes, a bias that may cause sampling error. This is especially true of survey collections from beaches. Detailed analysis are underway using the mass analysis technique pioneered by Ahler (1989). Completion of this analysis will allow more interpretation of the lithics found during the post-tsunami coastal survey.

CONCLUSION

The Tutuila post-tsunami coastal survey recorded archaeological materials at more than fifty discrete locations in beach and nearshore areas around the island. These range in size from large traditional settlements to single isolated artifacts. The well-preserved traditional settlements at abandoned locations, such as Aoloau Tuai and Fagafue Bay, offer unique opportunities for further investigation of Tutuila's late prehistoric period.

The presence of exposed stratigraphy with cultural strata at several locations around the island suggests that Tutuila's coasts are eroding and that archaeological deposits are being lost in coastal areas. Global climate change and sea-level rise should inspire a sense of urgency for the excavation and detailed study of these deposits before they are completely gone.

By far, lithics dominated the survey. They were found all around the coast in all contexts from primary deposition to material that had clearly been rolling on the beach for quite some time. This one small project nearly doubled the number of known lithic sites on Tutuila. This should indicate how rich the potential for further research on lithics is on Tutuila. It also indicates again how relatively little we know about basic parameters of Tutuila's lithic sites, such as number and distribution.

Although human suffering from the tsunami was great, damage to archaeological remains was highly localized, and given the size of the tsunami waves the damage was relatively light. In most cases, even direct erosion of beachside deposits appears to have removed relatively little of the archaeological deposits. In inspecting tsunami-affected villages, we puzzled over how one might see evidence of this tsunami hundreds of years from now in archaeological context. In most areas, there was little ground disturbance away from the beach or stream banks, and tsunami debris was quickly cleaned from village areas. However, it is quite possible to envision scenarios for the past in which tsunamis removed archaeological remains from primary context and deposited them in other contexts. This may well be reason for caution in attributing too much interpretive importance to single artifacts or single radiocarbon dates, even when excavated from seemingly "secure" contexts.

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Table 1. Sites designated in the Tutuila post-tsunami coastal survey.

Temp Site (T) #	Site name	Village	Easting	Northing	Site Description	Context
1	South Tula Lithic Scatter	Tula	547008.86	8424012.08	Lithic scatter	Both
2	Alao Cultural Layer 2	Alao	547044.06	8423088.18	Cultural layer	Primary
3	Alao Isolated Artifact	Alao	547020.87	8423044.21	Isolated artifact	Non-primary
4	Alao Isolated Flake	Alao	547158.82	8423338.00	Isolated flake	Non-primary
5	Alao Bridge Cultural Layer and Lithics	Alao	547259.64	8423589.72	Cultural layer, lithics	Primary
6	Utumea Isolated Flake	Utumea	546491.19	8422601.72	Isolated flake	Non-primary
7	Utumea Lithic Scatter	Utumea	546692.10	8422337.33	Lithic scatter	Primary
8	Utumea Lithic Scatter 2	Utumea	546256.54	8422323.93	Lithic scatter	Primary
9	ʻAuʻasi Lithic Scatter	ʻAuʻasi	545874.87	8422184.99	Lithic scatter	Non-primary
10	Utusiʻa/Fagaʻitua Cultural Layer and Lithic Scatter	Utusiʻa/Fagaʻitua	541292.17	8422301.78	Lithic scatter, cultural layer, midden	Both
11	Utusiʻa Cultural Layer	Utusiʻa	541216	8422292	Cultural layer, lithics	Primary
12	Utusiʻa Lithics 2	Utusiʻa	540970.58	8422255.17	Lithics in cutbank, lithic scatter	Non-primary
13	Utusiʻa Foaga	Utusiʻa	540880.26	8422234.07	Grinding stone, lithics in cutbank	Undetermined
14	Alega Beach Lithic Scatter	Alega	538985.59	8421221.81	Lithic scatter	Non-primary
15	ʻAoa Isolated Pottery	ʻAoa	544706.98	8423671.55	Isolated sherd	Non-primary
16	ʻAoa Beach Lithic Scatter	ʻAoa	544045.41	8423611.16	Lithic scatter	Non-primary
17	Saʻilele Beach Lithic Scatter	Saʻilele	543437.27	8423849.35	Lithic scatter	Non-primary
18	Masausi Beach Lithic Scatter	Masausi	542462.19	8423633.36	Lithic scatter	Non-primary
19	Afono Beach Lithic Scatter	Afono	537561.65	8423639.74	Lithic scatter	Non-primary
20	Amalau Foaga	Amalau	536827.92	8424250.44	Grinding stone	Non-primary
21	Vatia Beach Lithic Scatter	Vatia	535455.89	8424453.12	Lithic scatter	Primary
22	Fagasā Beach Lithic Scatter 1	Fagasā	529628.28	8420520.44	Lithic scatter	Non-primary
23	Fagasā Beach Lithic Scatter 2	Fagasā	529667.56	8420486.39	Lithic scatter	Non-primary
24	Fagasā Beach Lithic Scatter 3	Fagasā	529914.82	8420393.16	Lithic scatter	Non-primary
25	Fagasā Beach Lithic Scatter 4	Fagasā	530114.31	8420815.55	Lithic scatter	Non-primary
26	Fagamalo Beach Lithic Scatter	Fagamalo	520475.06	8419273.41	Lithic scatter	Non-primary
27	Mālōatā Beach Lithic Scatter	Mālōatā	519803.21	8418637.13	Lithic scatter	Non-primary
28	Fagaliʻi Foaga	Fagaliʻi	518763.24	8418334.44	Group of grinding stones	Undetermined
29	Fagaliʻi Beach Lithic Scatter	Fagaliʻi	518703.16	8418290.96	Lithic scatter	Non-primary
30	Poloa Beach Lithic Scatter	Poloa	517845.08	8417183.18	Lithic scatter	Non-primary
31	Seʻetaga Stream Lithic Scatter and Foaga	Seʻetaga	520391.71	8416425.79	Grinding stone, lithic scatter	Non-primary
32	Nua Stream Lithics	Nua	520791.02	8416017.57	Lithic scatter	Non-primary
33	Nua Foaga	Nua	520803.08	8415992.01	Group of grinding stones	Non-primary
34	Fagamutu Lithic Scatter	Fagamutu	520994.77	8415560.18	Lithic scatter	Non-primary
35	Fagamutu Cultural Layer and Lithic Scatter	Fagamutu	520896.86	8415686.13	Lithic scatter, cultural layer	Both
36	Fagalele Habitation and Lithic Scatter	Sogi (Leone)	522990.97	8414461.62	Habitation, lithic scatter	Primary
37	Atauloma Stream Foaga	Atauloma	521348.69	8415687.74	Group of grinding stones	Primary
38	Asili Beach Adze	Asili	520901.36	8415661.24	Islolated adze	Non-primary
39	Amaluʻia Stream Mouth Lithic Scatter	Amaluʻia	522111.87	8415364.90	Lithic scatter	Undetermined
40	Amaluʻia West Stream Foaga	Amaluʻia	522410.83	8415530.20	Group of grinding stones	Primary
41	Amaluʻia East Stream Foaga	Amaluʻia	522479.36	8415469.86	Group of grinding stones	Primary
42	Aʻuma Beach Lithic Scatter	Aʻuma (Leone)	522847.05	8414974.93	Lithic scatter	Non-primary
43	Vailoatai Foaga	Vailoatai	523134.68	8412923.38	Grinding stone	Undetermined
44	Taputimu Cupules	Taputimu	524159.29	8412330.70	Cupules	Primary
45	Vaitogi Beach Foaga	Vaitogi	528800.01	8412977.53	Group of grinding stones	Primary
46	Airport Beach Foaga	Tāfuna	530982.48	8415148.09	Group of grinding stones	Primary
47	Alōfau Beach Lithic Scatter	Alōfau	542636	8422034	Lithic scatter	Non-primary
48	ʻAūa/Lauliʻi Lithic Scatter	ʻAūa/Lauliʻi	536347	8420314	Lithic scatter	Non-primary
49	Vaitogi Beach Cultural Layer	Vaitogi	528513.21	8412802.78	Cultural layer, midden	Primary
50	Maliu Mai Human Bones	Fogāgogo	529989.05	8414469.11	Human bones	Undetermined
51	Aoloau Tuai Coastal Plain	Aoloau Tuai	523778.85	8419566.04	Old village	Both
52	Asu Tuai Beach Lithic Scatter	Asu Tuai	525930.19	8419883.74	Lithic scatter	Both
53	Fagafue Stream and Coastal Plain	Fagafue	526777.62	8419321.86	Habitation, agriculture, lithic scatter	Both

Table 2. Preliminary lithic analysis.

Temp Site (T)#	Village	Adzes	Preforms and Blanks	Cores	Flakes	Total	Comments*
1	Tula	0	0	0	19	19	
4	Ālao	0	0	0	1	1	
5	Ālao	0	0	0	1	1	
6	Utumea	0	0	0	1	1	
7	Utumea	0	9	0	32	41	
8	Utumea	0	1	0	1	2	
9	ʻAuʻasi	0	1	0	12	13	
10	Utusiʻa/ Fagaʻitua	0	8	0	49	57	
11	Utusiʻa	0	5	0	50	55	
12	Utusiʻa	0	0	0	11	11	
14	Ālega	0	2	0	25	27	
16	ʻAoa	0	0	0	5	5	
17	Saʻilele	0	0	0	11	11	
18	Masausi	1	0	0	13	14	Adze- Type I with use wear
19	Āfono	0	0	0	10	10	
21	Vatia	1	0	0	48	49	Adze- Type III
22 to 25	Fagasā	2	13	2	132	149	Adze- 1 fully polished fragment; 1 reworked Type I
26	Fagamalo	0	6	1	71	78	
27	Mālōatā	1	23	1	82	107	Adze- 1 Type III reworked into scraper/ grater
29	Fagaliʻi	0	1	0	4	5	
30	Poloa	0	2	1	17	20	
31	Seʻetaga	0	1	0	13	14	
32	Nua	0	0	0	10	10	
35	Fagamutu	0	0	0	4	4	
36	Fagalele	0	0	0	1	1	
37	ʻĀtauloma	0	0	0	1	1	Also 4 pieces of shatter
38	Āsili	1	0	0	0	1	Adze- Probable Type I
39	Āmaluʻia	0	0	0	1	1	
42	Āʻuma	1	1	0	48	50	Adze- Heavy usewear; top polished, therefore, likely Type I
47	Ālōfau	0	0	0	2	2	
51	Aoloau	3	11	0	379	393	Adze- 2 undetermined, both have some polish; 1 Type I
52	Āsu Tuai	1	0	0	51	52	Adze- polished, butt fragment; type un-determined
53	Fagafue	0	3	0	139	142	
	Totals	11	87	5	1244	1347	

* Adze type follows Green and Davidson (1969) and revisions by Green (1974).